Knowledge Management, Strategic Management Accounting, and Management Control Systems as Pathways to Firm Performance: Evidence from Export-Oriented Manufacturing SMEs in Central Java, Indonesia

RIEKE PERNAMASARI[1,2,*], ANIS CHARIRI[1], AGUS PURWANTO[1]
[1]Faculty of Economics and Business,
Universitas Diponegoro,
Jl. Prof. Sudarto, Tembalang,
Semarang 50275,
INDONESIA

[2]Faculty of Economics and Business,
Universitas Mercu Buana,
Jl. Meruya Selatan,
West Jakarta, DKI Jakarta 11650,
INDONESIA

**Corresponding Author*

Abstract: - This study examines how knowledge management (KM) operationalised through innovation knowledge (IK) and risk management knowledge (RMK) is associated with the firm performance of export-oriented manufacturing small and medium-sized enterprises (SMEs) in Central Java, Indonesia, with Strategic Management Accounting (SMA) and Management Control Systems (MCS) as dual mediating mechanisms. Firm performance is conceptualised as a multidimensional construct encompassing financial, export, and reputational performance dimensions. A quantitative cross-sectional survey was administered to 227 owners and managers of export-oriented manufacturing SMEs via an online platform in March 2025. Twelve hypotheses were tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) via WarpPLS 8.0, grounded in the Resource-Based View (RBV), Knowledge-Based View (KBV), and Contingency Theory. The structural model achieved strong explanatory power ($R^2 = 0.790$ for firm performance). Results indicate that both IK ($\beta = 0.250$) and RMK ($\beta = 0.433$) are significantly and positively associated with firm performance. Mediation analysis reveals an asymmetric pattern: MCS mediates both KM–performance pathways, while SMA only mediates the RMK–performance pathway. The IK–SMA–performance pathway is not supported. These findings suggest a potential boundary condition: SMA's effectiveness as a knowledge-to-performance conversion mechanism is contingent upon the quantifiability and measurability of the knowledge input. This study contributes to the management accounting and knowledge management literatures by revealing an asymmetric dual mediation pattern that establishes differential roles for SMA and MCS in translating knowledge resources into firm performance in an export-oriented SME context in a developing economy.

Key-Words: - knowledge management; innovation knowledge; risk management knowledge; strategic management accounting; management control systems; firm performance; export-oriented SMEs.

Received: June 2, 2026. Revised: July 1, 2026. Accepted: July 28, 2026. Published: September 15, 2026.

1 Introduction

In an era of intensifying global competition, small and medium-sized enterprises (SMEs) face mounting pressure to develop and sustain competitive advantages that enable effective participation in international markets. Firm performance encompassing financial, export, and reputational outcomes has emerged as a critical indicator of SME competitiveness [1], [2]. Empirical research consistently demonstrates that many SMEs, particularly in developing economies, struggle to

convert their operational capabilities into sustained performance improvements [3].

Knowledge management (KM) has been widely recognised as a key driver of firm performance [4], [5], [6]. The Knowledge-Based View (KBV) posits that a firm's capacity to generate, integrate, and apply knowledge constitutes the most strategically significant source of sustainable competitive advantage [5], [7]. KM is particularly consequential for SMEs, which depend disproportionately on knowledge intensity encompassing innovation knowledge (IK) and risk management knowledge (RMK) to navigate market uncertainty and improve performance [8], [9]. Evidence from innovation systems further suggests that the innovation-investment activity of SMEs is among the most significant drivers of economic performance, second only to institutional and infrastructural factors [10].

Despite its theoretical primacy, the empirical relationship between KM and firm performance remains inconclusive [11], [12], [13]. [14] found that KM had no direct effect on business performance without a mediating mechanism, suggesting that intervening organisational variables are essential conduits for converting knowledge into performance outcomes.

Strategic Management Accounting (SMA) and Management Control Systems (MCS) represent two such intervening mechanisms. SMA, conceptualised by [15] and developed by [16], provides accounting information with an explicit strategic orientation encompassing competitor analysis, strategic cost management, and market-focused performance measurement [17]. MCS encompasses the formal and informal mechanisms through which organisations direct resources toward strategic objectives [18], [19]. Together, SMA and MCS constitute the accounting and control infrastructure through which firm-level knowledge may be translated into strategic decisions associated with improved performance [20], [21].

Prior studies have investigated SMA and MCS largely in isolation and predominantly in large organisations, leaving SMEs undertheorised [22], [23]. The literature has yet to examine how KM interacts with both SMA and MCS simultaneously as dual mediating pathways in export-oriented SME contexts. Indonesia presents a compelling setting: Central Java Province hosts a dense concentration of export-oriented manufacturing SMEs in sectors including textiles, batik, furniture, and food processing, yet these firms continue to face structural challenges in sustaining performance improvements [24], [25].

This study addresses three research gaps: (1) the role of SMA and MCS as dual mediating mechanisms in the KM–firm performance relationship has not been empirically validated in an export-oriented SME context; (2) most SMA and MCS research focuses on large enterprises, leaving SMEs undertheorised; and (3) the Indonesian manufacturing SME sector remains empirically underdeveloped in the international management accounting literature. The research model is presented in Figure 1.

2 Theoretical Framework and Hypotheses

2.1 Theoretical Foundation

This study is grounded in three complementary theories. The Resource-Based View (RBV) posits that sustainable competitive advantage derives from internal firm resources that are valuable, rare, inimitable, and non-substitutable [26]. Both IK and RMK constitute strategic intangible resources embedded in the tacit knowledge and managerial capabilities of SME owners. The Knowledge-Based View (KBV), building on [5], positions knowledge as the most strategically significant organisational resource. Contingency Theory [19], [27] holds that the effectiveness of management accounting and control systems is contingent upon contextual factors including knowledge inputs, environmental uncertainty, and organisational strategy. Together, these theories explain both why KM is associated with performance and why this translation may be selectively mediated by SMA and MCS. Evidence from regional innovation systems supports this proposition, suggesting that knowledge inputs tend to show weak direct performance effects in the absence of institutional and infrastructural mediating mechanisms [10].

2.2 Innovation Knowledge and Firm Performance (H1)

Innovation knowledge (IK) is operationalised as managers' understanding and capability to generate, manage, and apply new ideas to create added value [28], [29]. From the RBV, IK constitutes a VRIN resource embedded in the tacit creative capacity of SME owners [26]. In export-oriented settings, IK may enable SMEs to develop new products and build reputational advantages associated with superior firm performance [1]. This contrasts with [14], who found no direct KM–performance association in Rwandan SMEs, potentially attributable to different contextual conditions and operationalisations.

H1: Innovation Knowledge (IK) is positively associated with Firm Performance (FP).

2.3 Risk Management Knowledge and Firm Performance (H2)

Risk management knowledge (RMK) is operationalised as a holistic approach to enterprise risk management, integrating systematic identification, evaluation, and control of risks [30]. The RBV positions RMK as a strategic resource that simultaneously protects competitive advantage and may contribute to performance enhancement [31]. In export markets, firms with superior RMK may better anticipate and respond to risks such as exchange rate volatility, payment defaults, and regulatory challenges [32], [33]. Result [25] found risk management not significantly associated with Indonesian micro-enterprise sustainability, a contrast suggesting RMK's performance relevance may be particularly pronounced among export-oriented SMEs.

H2: Risk Management Knowledge (RMK) is positively associated with Firm Performance (FP).

2.4 SMA, MCS, and Firm Performance (H3–H4)

SMA encompasses strategic costing, strategic planning, competitive analysis, and customer profitability analysis [15], [16], [34]. MCS encompasses the formal and informal mechanisms through which managers ensure resources are deployed effectively [18], [22]. Consistent with Contingency Theory [19], [27], both SMA and MCS effectiveness are contingent on alignment with the firm's knowledge environment. For export-oriented SMEs in high-uncertainty environments, SMA and MCS may provide the strategic information and monitoring infrastructure associated with improved performance.

H3: SMA is positively associated with Firm Performance (FP).

H4: MCS is positively associated with Firm Performance (FP).

2.5 KM as Antecedent of SMA and MCS (H5–H8)

The KBV holds that knowledge resources drive the development of distinctive organisational capabilities [5], while Contingency Theory holds that accounting and control system design is shaped by the firm's knowledge environment [19]. Innovation-oriented firms may require control systems supporting decentralised decision-making characteristics of MCS's interactive dimension [35], [36]. RMK generates informational demands compatible with both SMA's analytical tools, cost projections, scenario analyses, contingency budgeting, and MCS's monitoring functions [37], [38].

H5: IK is positively associated with SMA.
H6: IK is positively associated with MCS.
H7: RMK is positively associated with SMA.
H8: RMK is positively associated with MCS.

2.6 Mediating Roles of SMA and MCS (H9–H12)

The KBV posits that knowledge creates value through its integration into organisational processes [5]. The mediating roles of SMA and MCS may differ across the two KM dimensions, reflecting the compatibility between each knowledge type and each system's analytical capabilities. I IK is characteristically exploratory, tacit, and qualitatively rich, embedded in creative processes difficult to quantify. SMA's analytically oriented framework, focused on measurable cost structures, competitor benchmarks, and customer profitability metrics, may be structurally less equipped to capture and translate the value embedded in tacit, exploratory knowledge (H9). By contrast, RMK is inherently quantifiable, expressible in financial terms, and projectable into cost structures, making SMA a theoretically plausible conduit for channeling risk knowledge into strategic performance decisions (H10). MCS, with its broader scope encompassing financial reporting, operational control, performance monitoring, and strategic analysis, may accommodate both the exploratory character of IK and the systematic process-orientation of RMK [18], [22], [36], supporting H11 and H12.

H9: SMA mediates the IK–FP relationship.
H10: SMA mediates the RMK–FP relationship.
H11: MCS mediates the IK–FP relationship.
H12: MCS mediates the RMK–FP relationship.

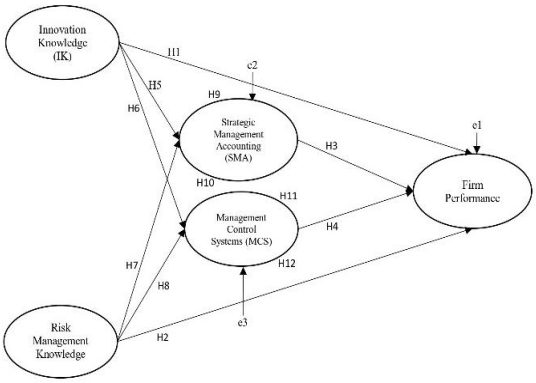

Fig. 1: Research model. H1–H2: direct effects of KM on FP; H3–H4: direct effects of mediators on FP; H5–H8: antecedent effects; H9–H12: mediated pathways

Source: Created by the authors.

3 Research Methodology

3.1 Research Design, Population, and Sampling

This study adopts a quantitative cross-sectional survey design. Data were collected from export-oriented manufacturing SMEs in Central Java Province, Indonesia, the second-largest SME concentration nationally. Trading SMEs were excluded, as manufacturing SMEs exhibit greater KM complexity. Purposive sampling was applied with inclusion criteria: (1) qualifying as an SME; (2) domiciled in Central Java; and (3) actively engaged in export, whether direct or indirect. Respondents were SME owners or managers verified during screening. Data collection was conducted in March 2025 via PopSurvey by Populix. Responses with completion times under five minutes were excluded. From 450 initial respondents, 141 failed screening, 9 were excluded for rapid completion, and 73 were trading SMEs. The final valid sample comprised 227 respondents (50.4% usable response rate). A pilot study with 21 respondents was conducted prior to the main data collection to verify instrument clarity.

3.2 Measurement Instruments

All constructs were measured using five-point Likert scales. Firm Performance (FP) was operationalised as a second-order reflective construct encompassing financial performance (4 items), export performance (2 items), and reputational performance (2 items), adapted from [1], [2]. Innovation Knowledge (IK) was measured through innovation exploration, resources, and speed (6 items), adapted from [28], [29]. Risk Management Knowledge (RMK) was measured across risk identification, evaluation, and control (11 items), adapted from [30]. SMA was measured through strategic costing, planning, competitive analysis, and customer profitability (12 items), adapted from [34], [39]. MCS was measured through financial control, performance analysis, operational control, and profitability (13 items), adapted from [22], [40]. All items were translated into Indonesian following an expert-review procedure. Table 1 presents the operational variable summary.

Table 1. Operational variable summary

Variable	Dimension	Items	Source
Firm Performance (FP)_ Dependent	Financial, Export, Reputation	8	[1], [2]
Innovation Knowledge (IK)_Independent	Exploration, Resources, Speed	6	[28], [29]
Risk Mgmt Knowledge (RMK)_Independent	Identification, Evaluation, Control	11	[30]
SMA_Mediator	Strategic Cost, Planning, Competition, Customer	12	[34], [39]
MCS_Mediator	Financial, Performance, Operational, Profitability	13	[22], [40]

Source: created by the authors

3.3 Analytical Method

Hypothesis testing was conducted using PLS-SEM via WarpPLS 8.0. PLS-SEM was selected because: (1) the model integrates second-order reflective constructs; (2) WarpPLS accommodates nonlinear relationships [41]; and (3) PLS-SEM imposes no strict distributional assumptions [42]. All constructs were specified as reflective.

The structural model for this study is expressed as the following system of equations:

$$FP = \beta_1\ IK + \beta_2\ RMK + \beta_3\ SMA + \beta_4\ MCS + \varepsilon_1 \quad (1)$$

$$SMA = \beta_5\ IK + \beta_6\ RMK + \varepsilon_2 \quad (2)$$

$$MCS = \beta_7\ IK + \beta_8\ RMK + \varepsilon_3 \quad (3)$$

where FP = Firm Performance, IK = Innovation Knowledge, RMK = Risk Management Knowledge, SMA = Strategic Management Accounting, MCS = Management Control Systems, $\beta_1 - \beta_8$ = path coefficients, and $\varepsilon_1 - \varepsilon_3$ = error terms. The PLS-SEM algorithm estimates the parameter vector β by minimising residual variances of the endogenous latent variables through the following optimisation criterion:

$$\hat{\beta} = \text{argmin}\ \Sigma_i (y_i - X_i\beta)^2 \quad (4)$$

where y_i represents the endogenous latent variable scores, and X_i represents the matrix of exogenous latent variable scores for observation i. Convergence is assessed at each iteration using the stop criterion $\delta < 10^{-5}$, where δ denotes the maximum change in outer weights between successive iterations [41]. The indirect (mediation) effects are computed as products of the relevant path coefficients:

$IK \rightarrow SMA \rightarrow FP = \beta_5 \times \beta_3$;
$RMK \rightarrow SMA \rightarrow FP = \beta_6 \times \beta_3$;
$IK \rightarrow MCS \rightarrow FP = \beta_7 \times \beta_4$;
$RMK \rightarrow MCS \rightarrow FP = \beta_8 \times \beta_4$.

Outer model assessment included convergent validity (outer loading > 0.70, AVE > 0.50), composite reliability (CR > 0.70), Cronbach's alpha (CA > 0.70), and discriminant validity via Fornell-Larcker criterion. Inner model assessment included R^2, Q^2, path coefficients, effect sizes, and model fit indices (APC, ARS, AARS, AVIF ≤ 5.0, Tenenhaus

GoF ≥ 0.36). Mediation analysis followed [42] and Zhao et al. [43] using the Sobel test, with the standard error of the indirect effect computed as:

$$SE\_ab = \sqrt{(b^2 SE\_a^2 + a^2 SE\_b^2)} \quad (5)$$

Where a and b are the path coefficients of the two segments of the mediated pathway, and SE_a and SE_b are their respective standard errors. Common method bias was addressed through the anonymous self-administered online format; Harman's single-factor test indicated no single dominant factor.

As all hypotheses were formulated with explicit directional predictions grounded in the Resource-Based View, Knowledge-Based View, and Contingency Theory, one-tailed significance testing was applied as the primary criterion ($\alpha = 0.05$, $t > 1.65$), consistent with the directional nature of the hypothesised relationships [42]. Two-tailed p-values are additionally reported in the results tables for transparency and comparability with prior literature

3.4 Ethics Statement

This study was conducted in accordance with the ethical principles of Universitas Diponegoro and received institutional ethics clearance from the Research Ethics Committee of the Faculty of Psychology, Universitas Diponegoro (No: 15/SERTIF/KEPPU/IV/2026). At the time of data collection (March 2025), anonymous online survey research of this nature was classified as minimal-risk and exempt from mandatory prior ethics review under applicable institutional guidelines. All core ethical safeguards were observed throughout: participation was entirely voluntary, no personally identifiable information was collected, full participant information was provided prior to data collection, and implied electronic consent was obtained through voluntary completion of the anonymous online questionnaire. The subsequent formal ethics clearance confirmed compliance with WHO 2011 standards and CIOMS 2016 Guidelines.

4 Results

4.1 Respondent Profile

The final sample comprised 227 respondents. Female respondents were slightly predominant (54.19%). Most respondents were aged 25–35 years (73.57%). The majority were firm owners (62.10%). Most firms operated as CV legal entities (62.60%), had operated for 5–10 years (78.40%), and employed more than 40 workers (43.20%). Annual turnover was predominantly Rp 2–15 billion (45.81%). The dominant sector was textiles, batik, fashion, and accessories (44.10%). Indirect exporters comprised 74.40% of the sample.

4.2 Measurement Model Assessment

Table 2. presents the outer model results. All AVE values exceeded 0.50 (range: 0.728–0.831), confirming convergent validity. All constructs exceeded the 0.70 threshold for Cronbach's Alpha (range: 0.813–0.903) and Composite Reliability (range: 0.889–0.937). All item loadings exceeded 0.70 (range: 0.839–0.926, all $p < 0.001$)

Table 2. Second-order outer model results

Construct	AVE	CR	CA	R^2	Q^2
FP	0.809	0.927	0.881	0.790	0.792
IK	0.728	0.889	0.813	—	—
RMK	0.831	0.937	0.898	—	—
SMA	0.753	0.924	0.891	0.789	0.789
MCS	0.774	0.932	0.903	0.758	0.759

Note. FP=Firm Performance; IK=Innovation Knowledge; RMK=Risk Management Knowledge; SMA=Strategic Management Accounting; MCS=Management Control Systems.

Source: created by the authors

Discriminant validity was assessed using the Fornell-Larcker criterion (Table 3). For most construct pairs, the square root of AVE (diagonal values) exceeded the corresponding inter-construct correlations, confirming adequate discriminant validity for the majority of construct combinations. Three pairs exhibited borderline results: IK–RMK (0.854 vs. √AVE = 0.853), SMA–MCS (0.887 vs. √AVE = 0.868/0.880), and RMK–SMA (0.871 vs. √AVE = 0.831/0.868). To supplement the Fornell-Larcker criterion, cross-loadings were examined for all 17 indicators (Table 4). All indicators loaded substantially higher on their intended construct than on any other construct, with differences ranging from 0.202 to 0.829 across all indicator-construct pairs. The smallest difference was observed for indicator SI (IK construct: loading = 0.851, maximum cross-loading = 0.649, difference = 0.202), and all remaining indicators showed differences exceeding 0.339. This consistent pattern of item-level discriminant validity provides supplementary evidence of construct distinctiveness. The borderline Fornell-Larcker results reflect the high theoretical relatedness between the constructs — IK and RMK both represent managerial knowledge dimensions within the same KM domain, while SMA and MCS are both institutionalised management systems operating

within the same organisational context — rather than indicating fundamental measurement inadequacy. Full collinearity VIF values for RMK (6.355), SMA (6.561), and MCS (5.682) exceeded the recommended threshold of 5.0, reflecting the high theoretical relatedness among these constructs. While this level of collinearity warrants cautious interpretation of the individual path coefficients, it does not constitute a critical methodological concern, as all VIF values remained below 10.0 — the threshold beyond which collinearity is generally considered to severely distort structural estimates [42]. The theoretical coherence and directional consistency of all path coefficients across the hypothesised relationships provide additional confidence in the interpretability of the structural model. These measurement limitations are fully acknowledged in the conclusions section.

Table 3. Discriminant validity — Fornell-Larcker criterion

	FP	IK	RMK	SMA	MCS
FP	**(0.899)**	0.823	0.858	0.821	0.800
IK	0.823	**(0.853)**	0.854	0.823	0.835
RMK	0.858	0.854	**(0.912)**	0.871	0.834
SMA	0.821	0.823	0.871	**(0.868)**	0.887
MCS	0.800	0.835	0.834	0.887	**(0.880)**

Note. Diagonal values in parentheses are square roots of AVE. Borderline results acknowledged as a study limitation.

Source: created by the authors

Table 4. Combined Loading and Cross-Loadings

Indicator	Construct	FP	IK	RMK	SMA	MCS	Diff.†
Firm Performance (FP) Indicators							
KK	FP	**0.917**	0.174	0.041	-0.129	0.002	0.743
KE	FP	**0.903**	0.041	0.074	0.043	-0.063	0.829
KR	FP	**0.877**	-0.224	-0.119	0.091	0.063	0.653
Innovation Knowledge (IK) Indicators							
EI	IK	-0.019	**0.870**	-0.152	0.128	0.193	0.677
SI	IK	-0.092	**0.851**	0.649	-0.253	-0.032	0.202
KI	IK	0.114	**0.839**	-0.500	0.124	-0.168	0.339
Risk Management Knowledge (RMK) Indicators							
IR	RMK	0.025	0.014	**0.926**	-0.129	0.114	0.797
ER	RMK	-0.050	0.019	**0.921**	-0.201	0.149	0.720
PR	RMK	0.025	-0.035	**0.887**	0.344	-0.274	0.543
Strategic Management Accounting (SMA) Indicators							
BS	SMA	0.037	0.297	-0.196	**0.884**	-0.226	0.587
PS	SMA	0.081	-0.466	0.071	**0.842**	-0.361	0.376
AP	SMA	-0.192	0.345	0.107	**0.883**	0.091	0.538
APL	SMA	0.080	-0.202	0.022	**0.861**	0.491	0.370
Management Control Systems (MCS) Indicators							
PK	MCS	0.112	-0.027	-0.181	0.200	**0.903**	0.703
AK	MCS	-0.162	0.089	0.033	0.113	**0.895**	0.733
PO	MCS	0.025	0.063	0.176	-0.190	**0.852**	0.662
APS	MCS	0.026	-0.126	-0.018	-0.138	**0.869**	0.731

Notes: Bold values indicate loadings of each indicator on its intended construct. Cross-loadings are oblique-rotated (WarpPLS 8.0). Diff.† = difference between main loading and maximum absolute cross-loading; positive values confirm item-level discriminant validity. All 17 indicators load substantially higher on their intended construct than on any other construct, with differences ranging from 0.202 (SI) to 0.829 (KE), confirming item-level discriminant validity. FP = Firm Performance; IK = Innovation Knowledge; RMK = Risk Management Knowledge; SMA =

Strategic Management Accounting; MCS = Management Control Systems.

Source: created by the authors

Indicator codes: FP indicators; KK (financial performance), KE (export performance), KR (reputational performance); IK indicators; EI (innovation exploration), SI (innovation speed), KI (innovation resources); RMK indicators; IR (risk identification), ER (risk evaluation), PR (risk prevention/control); SMA indicators; BS (strategic costing), PS (strategic planning), AP (competitive analysis), APL (customer profitability); MCS indicators; PK (financial control), AK (performance analysis), PO (operational control), APS (profitability analysis)

4.3 Model Fit

Model fit indices confirmed adequacy: APC ($p < 0.001$), ARS ($p < 0.001$), AVIF = 4.637 (≤ 5.0), Tenenhaus GoF = 0.779 (≥ 0.36 strong fit), and all ratio indices = 1.000 (ideal).

4.4 Direct Effects (H1–H8)

All eight direct-effect hypotheses were supported, as presented in Table 5. As all hypotheses were formulated with explicit directional predictions, one-tailed significance testing was applied as the primary criterion ($\alpha = 0.05$). Innovation knowledge was positively and significantly associated with firm performance (H1: $\beta = 0.250$, $p < 0.001$), while risk management knowledge demonstrated a stronger direct association (H2: $\beta = 0.433$, $p < 0.001$), indicating that RMK exerts greater influence on firm performance than IK in this export-oriented SME context. Both strategic management accounting (H3: $\beta = 0.113$, $p = 0.041$) and management control systems (H4: $\beta = 0.144$, $p = 0.014$) were positively associated with firm performance. Regarding the antecedent effects of knowledge management on the mediating variables, IK was positively associated with both SMA (H5: $\beta = 0.296$, $p < 0.001$) and MCS (H6: $\beta = 0.458$, $p < 0.001$). RMK demonstrated the strongest path coefficient in the model in its association with SMA (H7: $\beta = 0.620$, $p < 0.001$) and a significant association with MCS (H8: $\beta = 0.444$, $p < 0.001$).

Table 5. Direct effect results

Hyp.	Path	B	p(1-t)	p(2-t)	Dec.
H1	IK → FP	0.250	<0.001	<0.001	✓
H2	RMK → FP	0.433	<0.001	<0.001	✓
H3	SMA → FP	0.113	0.041	0.082	✓†
H4	MCS → FP	0.144	0.014	0.028	✓
H5	IK → SMA	0.296	<0.001	<0.001	✓
H6	IK → MCS	0.458	<0.001	<0.001	✓
H7	RMK → SMA	0.620	<0.001	<0.001	✓
H8	RMK → MCS	0.444	<0.001	<0.001	✓

Note. † H3 marginal under two-tailed testing; interpret with caution.

Source: created by the authors

4.5 Mediation Effects (H9–H12)

Mediation hypotheses were tested using the Sobel test under a one-tailed significance criterion ($\alpha = 0.05$, $t > 1.65$), consistent with the directional nature of the hypothesised mediation pathways. As presented in Table 6, H9 (IK → SMA → FP) was not supported (indirect $\beta = 0.021$, $t = 1.599$, $p = 0.056$), indicating that SMA does not significantly transmit the association between IK and firm performance. H10 (RMK → SMA → FP) was supported (indirect $\beta = 0.041$, $t = 1.708$, $p = 0.044$), confirming partial mediation. H11 (IK → MCS → FP) was supported (indirect $\beta = 0.031$, $t = 2.108$, $p = 0.018$), and H12 (RMK → MCS → FP) was similarly supported (indirect $\beta = 0.030$, $t = 2.101$, $p = 0.018$), both confirming partial mediation following Zhao et al. (2010).

Table 6. Mediation results (Sobel test)

Hyp.	Path	t	p(1-t)	Type	Dec.
H9	IK→SMA→FP	1.599	0.056	—	✗
H10	RMK→SMA→FP	1.708	0.044	Partial	✓†
H11	IK→MCS→FP	2.108	0.018	Partial	✓
H12	RMK→MCS→FP	2.101	0.018	Partial	✓

Source: created by the authors

Note. † H10 marginal two-tailed (p=0.088). Bootstrapped CIs are recommended for future replication.

5 Discussion

5.1 Direct Effects of KM on Firm Performance

The confirmation of H1 is consistent with KBV propositions that the capacity to generate and apply innovative knowledge is associated with competitive advantage [5], [29]. The positive IK–FP association contrasts with [14], who found no direct effect in Rwandan SMEs, a difference potentially attributable to different contextual conditions and operationalisations of KM. H2 was confirmed with the

strongest path coefficient (β = 0.433), suggesting RMK is more strongly associated with firm performance than IK. This is consistent with RBV framing of RMK as a strategic resource [31], [32] and contrasts with [25], who found risk management not significant for Indonesian micro-enterprise sustainability.

5.2 Direct Effects of SMA and MCS

Both H3 and H4 were supported, though H3's marginal two-tailed significance warrants caution. The SMA–performance association is consistent with RBV arguments positioning SMA as an information capability enabling value-generating decisions [16] and with Contingency Theory's prediction that SMA's contribution is maximised when aligned with competitive strategy [19]. The MCS–performance association is consistent with prior Indonesian SME evidence [44], [45].

5.3 KM as Antecedent of SMA and MCS

All four antecedent hypotheses were supported at $p < 0.001$. The strongest path, RMK to SMA (β = 0.620), suggests that risk awareness is most strongly associated with strategic accounting adoption, consistent with [20], [38]. The stronger path from IK to MCS than to SMA is theoretically coherent with Contingency Theory's proposition that innovation-oriented firms require control systems supporting decentralisation and experimentation [36], [35].

5.4 Asymmetric Mediation Pattern

The most theoretically significant finding is the asymmetric mediation pattern. MCS consistently mediated both KM–performance pathways (H11 and H12 supported), while SMA mediated only the RMK–performance pathway (H10 supported) and did not significantly mediate the IK–performance pathway (H9 not supported).

The non-confirmation of H9 is interpretable through Contingency Theory: IK's exploratory, tacit, and qualitatively rich character creates a structural incompatibility with SMA's analytically oriented framework [16], [38]. The confirmation of H10 suggests that when knowledge is risk-oriented and inherently quantifiable, SMA may function as an effective conduit [16], [38]. The confirmed mediation of MCS for both H11 and H12 is consistent with MCS's broader functional scope [18], [22]. This aligns with broader evidence that institutional mechanisms are important conduits for knowledge-to-performance translation [10]. These findings suggest a potential boundary condition extending the dual mediation literature [20], [21], [46].

6 Conclusions

This study examined the associations between KM and firm performance among export-oriented manufacturing SMEs in Central Java, Indonesia, with SMA and MCS as dual mediating mechanisms. Both KM dimensions were positively associated with firm performance. The central finding is the asymmetric mediation pattern: MCS consistently mediated both KM–performance pathways while SMA operated selectively, suggesting a potential boundary condition: SMA's effectiveness may be contingent upon the quantifiability of the knowledge input. For SME practitioners and policymakers, knowledge investment should be complemented by the development of adaptive, interactive control systems.

This study has several limitations. First, the cross-sectional design limits causal inference, and all findings should be interpreted as associations consistent with the theoretical framework rather than causal relationships — a constraint common to survey-based management research. Second, the borderline discriminant validity results for the IK–RMK and SMA–MCS construct pairs warrant cautious interpretation of the individual structural estimates. Third, the sample is restricted to Central Java Province, which limits the generalisability of the findings to broader Indonesian or ASEAN SME populations. Future research should employ longitudinal designs, objective firm performance data, and multi-provincial or cross-country samples to further validate the asymmetric mediation pattern identified in this study.

Acknowledgement

This research was supported by the Indonesian Education Scholarship (BPI), Center for Higher Education Funding and Assessment (PPAPT), Ministry of Higher Education, Science and Technology of the Republic of Indonesia, and Indonesian Endowment Fund for Education (LPDP). Ministry of Finance of the Republic of Indonesia.

References:

[1] H. J. Cho, B. E. Jin, and D. C. Shin, "Do contingencies matter between organizational capabilities and SME export performance?" Review of International Business and Strategy, Vol.33, No.4, 2023, pp.605–626. doi: 10.1108/RIBS-12-2021-0163

[2] H. T. Keh, T. T. M. Nguyen, and H. P. Ng, "The effects of entrepreneurial orientation and marketing information on the

performance of SMEs," Journal of Business Venturing, Vol.22, No.4, 2007, pp.592–611. doi: 10.1016/j.jbusvent.2006.05.003.

[3] G. Santoro, A. Mazzoleni, R. Quaglia, and L. Solima, "Does age matter? The impact of SMEs' age on the relationship between knowledge sourcing strategy and internationalization," Journal of Business Research, Vol.128, 2021, pp.779-787. doi: 10.1016/j.jbusres.2019.05.021.

[4] I. Nonaka and H. Takeuchi, The Knowledge-Creating Company, Oxford University Press, New York, 1995.

[5] R. M. Grant, "Toward a knowledge-based theory of the firm," Strategic Management Journal, Vol.17, 1996, pp.109–122. https://doi.org/10.1002/smj.4250171110.

[6] K. Dalkir, Knowledge Management in Theory and Practice, 2nd ed., MIT Press, Cambridge, MA, , 2011.

[7] A. H. Gold, A. Malhotra, and A. H. Segars, "Knowledge management: An organizational capabilities perspective," Journal of Management Information Systems, Vol.18, No.1, 2001, pp.185–214. doi: 10.1080/07421222.2001.11045669.

[8] M. Massaro, "Knowledge management in small and medium enterprises: A structured literature review," Journal of Knowledge Management, Vol.20, No.2, 2016, pp.258–291. doi: 10.1108/JKM-08-2015-0320.

[9] M. Hock-Doepgen, T. Clauss, S. Kraus, and C. F. Cheng, "Knowledge management capabilities and organizational risk-taking for business model innovation in SMEs," Journal of Business Research, Vol.130, 2021, pp.683–697. doi: 10.1016/j.jbusres.2019.12.001.

[10] O. V. Sysoeva and V. V. Sysoev, "Innovative development of regions: An integrated analysis of infrastructure, investment, and human capital," Administrative Sciences, Vol.16, No.4, 2026, p.164. doi: 10.3390/admsci16040164

[11] J. Darroch, "Knowledge management, innovation and firm performance," Journal of Knowledge Management, Vol.9, No.3, 2005, pp.101–115. doi: 10.1108/13673270510602809.

[12] T. Andreeva and A. Kianto, "Does knowledge management really matter? Linking knowledge management practices, competitiveness and economic performance," Journal of Knowledge Management, Vol.16, No.4, 2012, pp.617–636. doi: 10.1108/13673271211246185.

[13] S. Durst, C. Hinteregger, and M. Zieba, "The linkage between knowledge risk management and organizational performance," Journal of Business Research, Vol.105, 2019, pp.1–10. doi: 10.1016/j.jbusres.2019.08.002.

[14] E. Byukusenge and J. C. Munene, "Knowledge management and business performance: Does innovation matter?" Cogent Business & Management, Vol.4, No.1, 2017, p.1368434. doi: 10.1080/23311975.2017.1368434

[15] K. Simmonds, "Strategic management accounting," Management Accounting, Vol.59, No.4, 1981, pp.26–29.

[16] S. Cadez and C. Guilding, "An exploratory investigation of an integrated contingency model of strategic management accounting," Accounting, Organizations and Society, Vol.33, 2008, pp.836–863. doi: 10.1016/j.aos.2008.01.003.

[17] M. M. Rashid, M. M. Ali, and D. M. Hossain, "Strategic management accounting practices: A literature review," Asian Journal of Accounting Research, Vol.6, No.1, 2021, pp.109–132. doi: 10.1108/AJAR-06-2019-0051.

[18] J. F. Henri, "Management control systems and strategy: A resource-based perspective," Accounting, Organizations and Society, Vol.31, No.6, 2006, pp.529–558. doi: 10.1016/j.aos.2005.07.001.

[19] R. H. Chenhall, "Management control systems design within its organizational context," Accounting, Organizations and Society, Vol.28, 2003, pp.127–168. doi: 10.1016/S0361-3682(01)00027-7.

[20] R. Maelah, B. A. H. Mohamed, and A. M. Amir, "Strategic management accounting information and performance: Mediating effect of knowledge management," The South East Asian Journal of Management, Vol.16, No.1, 2022, pp.1–25. doi: 10.21002/seam.v16i1.1085.

[21] A. C. Yoshikuni et al., "Effects of knowledge management processes by strategic management accounting on organizational ambidexterity," Global Journal of Flexible Systems Management, Vol.25, No.3,2024, pp.513-532. doi: 10.1007/s40171-024-00398-9.

[22] S. Jankala, Management Control Systems in the Small Business Context, Doctoral

Dissertation, University of Oulu, Finland, 2007.

[23] L. Ma, X. Chen, J. Zhou, and L. Aldieri, "Strategic management accounting in SMEs in emerging countries," Economies, Vol.10, No.4, 2022. pp.1-23. doi: 10.3390/economies10040074.

[24] E. Herlinawati and A. Machmud, "The effect of innovation on increasing business performance of SMEs in Indonesia," WSEAS Transactions on Business and Economics, Vol.17,No.7, 2020, pp.51–57. doi: 10.37394/23207.2020.17.7.

[25] L. Nugroho and W. Utami, "Internal control and risk management issues on the sustainability micro and small enterprises in Indonesia," BILTURK Journal of Economics and Related Studies, Vol.4, No.1, 2022, pp.1–19. doi: 10.47103/bilturk.993568.

[26] J. Barney, "Firm resources and sustained competitive advantage," Journal of Management, Vol.17, No.1, 1991, pp.99–120. doi: 10.1177/014920639101700108.

[27] D. Otley, "The contingency theory of management accounting and control: 1980–2014," Management Accounting Research, Vol.31, 2016, pp.45–62. doi: 10.1016/j.mar.2016.02.001.

[28] I. W. E. Arsawan et al., "Developing organizational agility in SMEs: An investigation of innovation's roles and strategic flexibility," Journal of Open Innovation, Vol.8, No.3, 2022, p.149. doi: 10.3390/joitmc8030149.

[29] R. J. Calantone, C. S. Tamer, and Z. Yushan, "Learning orientation, firm innovation capability, and firm performance," Industrial Marketing Management, Vol.31, 2002, pp.515–524. doi: 10.1016/S0019-8501(01)00203-6.

[30] J. Brustbauer, "Enterprise risk management in SMEs: Towards a structural model," International Small Business Journal, Vol.34, No.1, 2016, pp.70–85. doi: 10.1177/0266242614542853.

[31] M. Grillitsch, T. Schubert, and M. Srholec, "Knowledge base combinations and firm growth," Research Policy, Vol.48, No.1, 2019, pp.234–247. doi: 10.1016/j.respol.2018.08.009.

[32] S. Apaloo and D. Bright, "The effect of risk management practices on performance of SMEs," Enterprise Risk Management, Vol.7, No.1, 2022. pp.1-16. doi: 10.5296/erm.v7i1.19287.

[33] A. U. Rehman and M. Anwar, "Mediating role of enterprise risk management practices between business strategy and SME performance," Small Enterprise Research, Vol.26, No.2, 2019, pp.207–227. doi: 10.1080/13215906.2019.1624385.

[34] B. Oyewo, "Contextual factors moderating the impact of strategic management accounting on competitive advantage," Journal of Applied Accounting Research, Vol.23, No.5, 2022, pp.921–949. doi: 10.1108/JAAR-04-2021-0108.

[35] J. Bisbe and D. Otley, "The effects of the interactive use of management control systems on product innovation," Accounting, Organizations and Society, Vol.29, No.8, 2004, pp.709–737. doi: 10.1016/j.aos.2003.10.010.

[36] R. Simons, Levers of Control: How Managers Use Innovative Control Systems to Drive Strategic Renewal, Boston: Harvard Business School Press, 1995.

[37] E. C. Braumann, I. Grabner, and A. Posch, "Tone from the top in risk management," Accounting, Organizations and Society, Vol.84, 2020, p.101128. doi: 10.1016/j.aos.2020.101128

[38] O. Fomina et al., "Risk-oriented strategic management accounting in Ukraine," Business: Theory and Practice, Vol.24, No.2, 2023, pp.533–543. doi: 10.3846/btp.2023.18951.

[39] P. Petera and L. Šoljaková, "Use of strategic management accounting techniques by companies in the Czech Republic," Economic Research, Vol.33, No.1, 2020, pp.46–67. doi: 10.1080/1331677X.2019.1697719.

[40] D. Quinco, "Management control systems practices in small and medium enterprises," Journal of Education, Management and Development Studies, Vol.3, No.4, 2023, pp.1–10. doi: 10.52631/jemds.v3i4.226

[41] M. Sholihin and D. Ratmono, Analisis SEM-PLS dengan WarpPLS 7.0 untuk Hubungan Nonlinier dalam Penelitian Sosial dan Bisnis, Penerbit Andi, Jogyakarta, 2021.

[42] J. F. Hair, G. T. M. Hult, and C. M. Ringle, A Primer on PLS-SEM, 2nd ed., SAGE, 2017.

[43] X. Zhao, J. G. Lynch, and Q. Chen, "Reconsidering Baron and Kenny: Myths and truths about mediation analysis," Journal of Consumer Research, Vol.37, No.2, 2010, pp.197–206. doi: 10.1086/651257.

[44] S. Tiara, D. C. Ovami, and E. Setiana, "Strategic management accounting model for

the sustainability of MSMEs in Medan," COSTING, Vol.6, No.2, 2023, pp.1232–1239. doi: 10.31539/costing.v6i2.5100.

[45] Nurhidayah and I. Badollahi, "Determinan peningkatan kinerja bisnis: Model kontinjensi akuntansi manajemen strategik," Al-Buhuts, Vol.18, No.2, 2022, pp.338–342. doi: 10.30603/ab.v18i2.3069.

[46] R. M. Baron and D. A. Kenny, "The moderator–mediator variable distinction in social psychological research," Journal of Personality and Social Psychology, Vol.51, No.6, 1986, pp.1173–1182. doi: 10.1037/0022-3514.51.6.1173.

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

Rieke Pernamasari: Conceptualization, Data curation, Investigation, Visualization, Writing - original draft.
Anis Chariri: Project administration, Resources, Supervision, Validation, Writing - review & editing.
Agus Purwanto: Formal Analysis, Methodology, Validation, Writing - review & editing

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

This research was supported by the Indonesian Education Scholarship (BPI), Center for Higher Education Funding and Assessment (PPAPT), Ministry of Higher Education, Science and Technology of the Republic of Indonesia, and Indonesian Endowment Fund for Education (LPDP). Ministry of Finance of the Republic of Indonesia.

Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.